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The natives, the fur-traders, the priests, the soldiers, the lumbermen, the fishermen and the miners have opened the region. It remains for agricultural and commercial pursuits to make use of it to its greatest capacity and continue the progressive development and utilization of its resources.

MAPS OF PRIMITIVE PEOPLES*

TRANSLATED FROM THE RUSSIAN AND ABRIDGED BY

H. DE HUTOROWICZ

This quarto volume is a work on the origin and development of the map. A map which N. L. Gondatti brought from the Tchuktchi country, northeast Asia, in the basin of the Anadyr River, suggested the idea of writing it. The author gave special attention to primitive maps when he was studying with Ratzel in Leipzig and also during his cartographic studies. After examining the Tchuktchi map in the Anthropological Museum of the Moscow University, he endeavored to find primitive maps in Berlin, Paris, Rome, Dresden, London and other cities, but found only three maps of the Marshall Islands in the Grassi Museum of Leipzig. In 1907 he found in Stockholm maps by the Greenland Eskimo and then succeeded in procuring for examination the Grösser collection in Berlin. About that time the Khatanga expedition of the Imperial Russian Geographical Society returned with a large collection of maps made by Samoyeds, Tunguses, Yakuts, Dolgans and three maps from the Kolyma R. region now at the Museum of the Imperial Academy of Sciences at St. Petersburg. He also found at this museum Rink's Eskimo map. All this material, together with maps sent by American scientific institutions, completed the collection used in preparing this work. It embraces fifty-five maps from Asia, fifteen from America, three from Africa, forty from Australia and Oceania and two from the East Indies.

Good eyesight and a highly developed gift among primitive peo-

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(*Bulletin of the Imperial Society of Students of Natural History, Anthropology and Ethnography, at the Imperial University of Moscow. Tome CXIX. Works of the Geographical Section, Number II. B. F. Adler. Maps of Primitive Peoples. St. Petersburg, 1910. viii and 350 pp.*)

ples of finding their bearings have helped to evolve cartographers among them. Many travelers have observed what some of them call "telescopic" eyesight among these peoples. A Yakut distinguished with the naked eye stars in the Pleiades not usually seen without a telescope. The Yakuts say there are many stars in this group, but only seven large ones. The Buriats guide their movements by the pole star at night and the sun by day. According to Mr. Jochelson, the natives of northeast Siberia usually find their bearings by the rise and setting of the sun, and by the stars at night. Caravan guides in the Sahara and Indians in the forests of Bolivia find their way under the most difficult circumstances. As for the Eskimos, their topographical aptitude is extraordinary. They have a large knowledge of the stars; and climbing to the tops of hills or mountains, they mark localities on their maps which are hidden from view at lower levels.

But many primitive peoples do not make maps though they have a good idea of the topography of their countries. The natives of the Andaman Islands have a well-developed sense of location, but not a single specimen of map-drawing. But the desire to express on a small scale some sort of a picture of the part of earth they live in is widespread. Some tribes carve maps out of wood, as the natives of east Greenland, some of the North American Indians and many Polynesians. When a traveler asks for directions to reach this or that place many Indians of South America, Negro tribes, Siberian natives or Australians rapidly sketch a map on the sand or snow, paper or birch bark. They seem to think that this graphic delineation will be more helpful than mere verbal guidance.

The Tchuktchi collection from the district of the Anadyr includes two specimens of maps drawn with reindeer blood on wooden boards. Both maps show the delta of the Anadyr. Mr. Adler describes the drawing as carefully done. The winding course of the river, the vegetation on the shores, fords, hunting-places, etc., are easily seen. The complicated delta with its numerous islands is faithfully reproduced. Two parallel lines show the shores, but the Yakuts, Samoyeds and some other tribes draw a river with one line. Many splashes of red on the shores, no doubt indicate hills. The map picture is enlivened by hunting and fishing scenes. At one corner is a group of three huts, fishing nets are spread in the middle of the river and a herd of swimming reindeer is shown. Mr. Adler asserts that the map in its general features compares, not unfavorably, with a map of the same region made by the Russian Ministry of the Marine. This product of the Tchuktchi, unfamiliar with draw-

ing instruments and correct methods, is a fine example of the cartographic art of primitive man.

Because ethnologists have shown the close relationship between the Tchuktchi and the Eskimo, Mr. Adler leaves his discussion of the maps of other Asian tribes at this point to treat at length of the Eskimo as map makers. He describes a map in R. Andree's "*Ethnographische Parallelen*" made by the Eskimo Kalliherua in the winter of 1850-51. Drawing his map with a lead pencil, the first he had ever seen, he showed the coast line from Pikierlu southward to Cape York with noticeable approximation to the truth. Then he discusses examples of other Eskimo maps found in the works of Nelson, Hall, Boas, Rink and others. Boas found much to commend in the maps of the Eskimo with whom he lived in Baffin Land. In answer to his geographical questions they would often begin at once to draw a map, sometimes on the snow. Five maps in the Boas collection are of Cumberland Sound, made by different Eskimo, and their similarities indicate care and considerable skill in the delineation of these coasts. The fiord character of Frobisher Sound and the mass of small islands and little bays are well indicated. The hatchings on some of the maps doubtless indicate the high elevation of the shores. When Beechey asked for information of the Eskimo of Kotzebue Sound they drew a map for him on the sand. They sketched a shoreline with a stick and divided it into equal parts, each part representing a day's march. They showed hills with heaped up sand and stones and made an island with pebbles. Many on-lookers made suggestions as the work went on.

All this was of the nature of a relief model, and the East Greenlanders, especially, make their maps in relief by carving them on boards that are drifted to their shores. They have the idea that relief maps represent nature more faithfully than other maps. Holm took home to Copenhagen three specimens of these reliefs. Of course the fundamental purpose of all these primitive maps is to show routes to hunting grounds, fisheries, settlements, etc. These East Greenlanders live on or near the coasts of fiords, and their routes are along the fiords or across them, at convenient places; so their relief maps mainly represent deep and narrow valleys and the intricate nature of the region is well shown in their deeply carved bits of wood on which they try to represent nature on a small scale.

Continuing his description of maps made by tribes of northern Asia, Mr. Adler gives special attention to the Tungus maps that were brought to Russia by the Khatanga expedition, and he is the first to reproduce specimens of them. Prince Kropotkin, P. E.

Ostrowski and others agree that the Tungus make maps with much skill, and Kropotkin says that during his travels in Transbaikalia he was greatly assisted by the information he found on a Tungus map that had been drawn on birch bark. None of the natives who drew the fifteen Tungus maps that appear in Mr. Adler's work had ever seen or heard of our cartographic products. They orient their maps not in accordance with cardinal points but with relation to the prevailing direction of the chief water artery. Like all maps of primitive or ancient peoples, a Tungus map is truest of the region best known to the map-maker, and this region is usually shown in the central part of his map, so that nearer the border, distances and surface features are likely to be less accurately shown. On the whole, however, the Khatanga expedition and Mr. Adler found a great deal to commend in the maps.

Among the other maps secured by the Khatanga expedition were three made by descendants of Russian peasants who are on the same cultural plane as the natives. Their maps are poorly drawn and in all respects are inferior to those of the aborigines. The Ostiaks, Gilaks, Ainy Karagoss and Soïots are mentioned among other Siberian peoples as having some aptitude for cartography, and specimens of maps from southern Sakhalin are given. The Turkoman peoples orient their maps exclusively by the main direction of the mountain ranges. Other peoples of North Asia, such as the Mongols and Buriats, draw maps only when requested to do so, though they have an excellent idea of direction. Several specimens of their maps show Buddhistic or Chinese influence, indicate every inhabited place, and mountains are sketched in the Chinese manner without perspective.

The maps made by the Indians of North America are strikingly similar to those made by the Yakuts, Tungus and other peoples of North Asia. Though Kroeber said that these Indians do not make maps, the author quotes Carver and several other authorities to show that the contrary is the case and that they draw route and other maps on sand, bark, leather, etc. Prof. Chamberlain has recently written that the Kootenay Indians of British Columbia have much cartographic aptitude. When he showed them a map of their country they at once pointed out the principal mountains, lakes, rivers and other features. They make good cartographic sketches. Eustace Jacobs says his Indian guides made good map sketches of regions they had traversed only once. Mr. Adler reproduces six maps (after Pickering) of the Oregon Indians. The guiding line is a river, lake or drainage system. Mountains also are sometimes

used for orientation, forests are rarely shown, but human habitations and the best hunting districts are indicated.

The Indians of South America are not far behind the tribes of the northern part of the western world in map-making. Specimens of their maps are shown in the books of Karl von den Steinen, P. Ehrenreich, M. Schmidt and Dr. Koch-Grünberg. A large collection has also been made by Dr. H. Meyer, who intends soon to publish his material. In the basin of the great Xingu tributary of the Amazon, the natives show rivers by straight lines, and lines across them mean waterfalls or swift currents. It is important to indicate them, because they are obstacles to navigation. When an old Indian was asked to tell what tribes live along a part of the Xingu River, he drew in the sand a map of the river and showed the location of the various tribes along its banks. With the aid of Indian maps, Prof. von den Steinen was able to trace the inter-dependence of the Kulisehu and Kuluene Rivers. In mapping the sources and upper tributaries of the Rio Negro, Dr. Koch-Grünberg derived some assistance from the maps of the natives. A particularly striking map, reproduced by Mr. Adler, shows the Caiary-Uaupes River at the point where it falls into the Caduiari River.

The natives of Africa are seldom mentioned in the literature of primitive map-making. Largeau says that the natives of the Sahara help out their narratives by drawing maps on the sand. One map shows the Ahoggar Range in the Central Sahara, which has only recently been well mapped by the French. On this map four parallel lines represent meridians, a fact that surprised Largeau, though Mr. Adler thinks it is not strange, as Arab traders have long disseminated geographical and cartographic ideas in the Sahara. A map drawn for Clapperton by the Sultan of Sokoto shows the Quorra or middle part of the Niger and the bordering regions. Beck brought home a map made by an Abyssinian showing the Godjeb as the upper part of the Sobat River, which is not the case.

Explorers have obtained a considerable number of maps made by Bushmen of South Africa and the Bantus of Central Africa. The chief of the Bakubas made a rather remarkable map of a part of the Sankuru River system for Dr. L. Wolf, the explorer of the Sankuru. Prof. K. Veule, one of the explorers of German East Africa, obtained several native maps. One of them shows the German colony throughout its east and west extent and Prof. Veule regards it as a remarkable product. [It certainly contains a great deal of information, though it is full of blunders. The map-maker appears to have faced the south during his work, so that the bottom of

the map is really its northern edge and his east and west directions are similarly transformed. He has laid down a number of caravan routes, names the tribes and the settlements along them and differentiates the houses of white men from the huts of the natives. He has some notion of scale and his east and west distances are not very erroneous, but the actual distances between stations and settlements is still badly distorted by the fact that some of his places are several degrees of latitude from their proper positions.—EDITOR]. Another map, reproduced by Mr. Adler, of the region lying around the southern end of Lake Tanganyika is declared by Prof. Veule to be astonishingly good, considering that it is the product of an untutored native.

Australian natives show distinct map-making aptitudes. They are good observers and thoroughly know the regions they inhabit. Dr. Jung says that in his travels around Lake Eyre and along the Darling, Warrego and Murrumbidgee Rivers he met natives among the various tribes who made for him good sketches of the route ahead. Dr. Neumayer found to be serviceable a native map, specially prepared for him, of a route he was about to follow near the lower Murray River. Ratzel wrote of the topographical talent of the Australian natives and said their "eye memory" made them geographers.

But the natives of Oceania surpass the Australian natives in map results. This is not surprising, for in their travels along the island coasts and from one island to another they must observe minute details of coasts, atolls, reefs, etc., in order to navigate intelligently and safely. The Polynesians are especially distinguished as travel-geographers. Native maps have been reported from many islands and groups, *e. g.*, New Zealand, Fiji, the Marshall, Palau and Ladrone groups, etc. The Maori have much geographical instinct. They made a map of Lake Rotokakahi for Hochstetter, and though their contours of the lake were not entirely correct, he found the map a good specimen of primitive work. The Palau Islanders make a sort of relief map of their islands. Adelung says these reliefs were helpful to the Spanish missionaries when the islands were discovered in 1696. A native map of Tahiti published by Forster is well known. Ratzel says that though this map gives names correctly, it misrepresents the size and position of islands in the Society Group. The map is cited, however, as throwing light on the spread of the Polynesians to the West.

The Marshall Islanders have always been unwilling to explain their maps, and they are hard to read, but the investigations of

Winkler and Schück seem to afford a good explanation of them. These maps consist of wooden sticks fastened together, at various angles, with shells and small stones. Winkler divides them into three groups: 1. Maps of the entire group; 2. Maps showing parts of the archipelago; 3. Charts used in navigation. The positions of the sticks give a variety of information, much of which is still obscure, but it is known that they indicate places where the combers fall most violently upon the shores. They show other movements of the sea, also distances between the islands; in fact, they are charts made by a sea-faring people to help them on their way and diminish the dangers of their voyages. These remarkable maps are well represented in European Museums.

Mr. Adler gives many pages to an examination of the so-called prehistoric maps that have been discovered. He inclines to the view of Fr. Rödinger that the two pieces of split bone covered with a network of lines, among the cave finds of Shafhausen, were meant to designate routes in some locality. A. Ernst maintains that many of the petroglyphs of Venezuela were intended to represent topographic forms; and Bastian believes that many of the petroglyphs discovered in Columbia are elementary maps. It is thought also that many Siberian petroglyphs show parts of the Yenisei River. Koch-Grünberg, P. Andree and others say they do not believe that carvings on rocks, many of them involving great labor, were made for mere pastime, and they agree with Shurz that not a few of them were "rude and awkward attempts at map-making."

Mr. Adler also compares, at length, the maps of the semi-cultured and cultured peoples of antiquity with those of the primitive peoples of to-day. In his opinion some of the maps produced in ancient Mexico and Peru were better and more serviceable than those made by Europeans in the Middle Ages. The Mexicans made maps, sea charts and cadastral plans that were better than those of the Persians. The Peruvians made relief maps of stone, clay and straw, but their work was inferior to that of the Mexicans. The cartography of the ancient civilizations of America appears to have had no influence upon the work of the modern primitive Americans. The Inca and Aztec cartography was entirely original, uninfluenced by any foreign models.

Assyro-Babylonian maps profoundly influenced the geographical knowledge and attainments of the Egyptians. Among these maps reproduced by Mr. Adler are a map of Babylon with text and a plan of the fortress of Babylon. Jewish cartography also was greatly influenced by the cartographic products of Babylon and Egypt.

Geography could not develop independently in small Palestine, but the country was on the main route between the two powerful nations to the east and west, and their geographical knowledge and ideas became those of the Jews. Carl Ritter was among those who believed that a map of Canaan was produced, though there is no direct evidence of it in Josephus. Herodotus mentioned that the old Persians made maps, though the Persians of to-day are poor cartographers and poor geographers as well. The geographical knowledge of ancient India shows both Babylonian and Chinese influence, and the Brahmins made maps of the world and of various regions. The oldest map of India, according to Ritter, was in the form of a lotus flower floating on the water. A map made by a Nepal native and described in the *Annales* of the Musée Guimet is a valuable document showing mountains, rivers and their confluence, routes, temples, towns, etc. A better map of India from a technical point of view was that presented to Warren Hastings in 1772. Some of these maps lack lines of latitude and longitude, have no scale, and mountains and rivers are shown by lines.

Historical documents show that the Chinese made town plans and drew maps as early as 3,000 B. C. None of these ancient documents have been preserved, as they were of the nature of secret papers, and many were intentionally destroyed. Two maps on stone are supposed to be the oldest in existence. They were discovered by P. G. Maurice and described by E. Chavannes. Both are reproduced in Mr. Adler's work. One of them has the title: "Map of China and of Foreign Lands," but shows only China and Korea and place names in other parts of the near-by world. The other shows places, mountains and rivers mentioned in the famous chapter of Chou-King entitled "Tribute of Yu." North is at the top of the map, in contrast with many other Chinese maps showing South at the top. Comparison of these with modern Chinese maps, in Mr. Adler's opinion, shows that the Chinese have not made much progress in cartography. [This, however, is certainly not true of recent Chinese maps, which show that Chinese cartography is becoming profoundly influenced by western methods.—EDITOR]. The Chinese had some astronomical knowledge, were good draughtsmen, and d'Anville called them the best cartographers in Asia.

Japanese maps antedated the oldest European work. The monks began to make maps soon after the introduction of Buddhism into Japan. Their acquaintance with Dutch and Portuguese traders helped them to attempt maps of the world. The maps they make to-day are as good as those of Europe.

Ancient Egypt bequeathed us an interesting type of map of which a considerable number still exist in the Turin and other museums. Mr. Adler reproduces two of them and gives a long description of the oldest yet found—a map showing the gold-bearing districts between the Nile and the Red Sea near the southern border of Upper Egypt. The Egyptians were strongly influenced by Arabian and Greek geographers and cartographers of whose maps we have no copies and all we know of them is from the writings of Herodotus, Aristotle and others. According to these references, all ancient Greek maps were round wheel maps. The later Romans improved upon the work of the Greeks. A fine example of a Roman map is the *Tabula Peutingeriana*, made in the reign of Augustus. It is interesting to compare this map with the sketch maps of primitive peoples. They differ greatly in the fact that the Roman map attempts to show the whole world as then known, while primitive map makers confine themselves to regions with which they are acquainted; but both are alike in having no degree nets, and in being little more than sketches of routes; and in both cases, the author tries to present the information of greatest importance to himself, other facts being almost ignored.

Ptolemy's maps were a turning point in the history of geography. They were superior to many maps of the Middle Ages. His work stimulated geographical research among the Arabs and, during the Renaissance, helped the development of cartography in Western Europe. The early maps of the Arabs show much knowledge of geography and care in drawing. They cannot be compared with the maps of primitive peoples, for many of them have a scientific basis, show astronomical determinations and represent vast areas. One Arab map, however, which attempts to show the course of the Nile from source to mouth, made in 1636, much resembles the primitive maps of to-day.

The maps of the Middle Ages have much in common with the maps of the early Greeks and Arabs and most of them were made by monks. The transition period, when map projections were introduced and surveys and measurements of the earth's surface began, connects the maps of the Middle Ages with modern map-making. It may be said, in a general way, that a comparison of the maps of civilized peoples in the old times with those of illiterate natives of the present day will often be in favor of the latter. The late Prof. S. Ruge, comparing the maps of old Germany with the primitive products of to-day, said that the maps made by Indians, Polynesians and Eskimo are more nearly correct than maps made by monks of the Twelfth century.

Summing up his long array of facts, Mr. Adler says that in the maps of primitive peoples, as a rule, we do not get the true orientation because bearings are based on the general directions of rivers, sea coasts, mountains, etc. The Yenisei Ostiak and the Marshall islanders are beginning to orient their maps by the cardinal points. The use of the compass is not generally known, but, when introduced, the natives at once see its advantages.

The materials used by primitive peoples depend on many conditions. Clay, sand and snow were first used in sketching maps, and these products most nearly approached those carved on stone. The Babylonians made maps on stone or baked clay even after parchment was known, preferring the durability of stone. Many of these maps have been preserved, while the wooden tablets of the Greeks and Romans have disappeared. The oldest Chinese maps were engraved on bronze urns, but as they were heavy, wood began to be used. Where the art of converting timber into boards was not known, bark was employed, and this is still used among nomad peoples. Later, maps drawn on leather or skins, textile fabrics and paper came into use. Among Mexicans, Chinese, Peruvians and others, maps on bark, wood or metal tablets were superseded by cotton and silk materials.

Tools used for drawing maps were first the finger tracing lines on sand or snow, then a stick, then a knife to carve wood. Then sticks dipped in coloring matter, pencils, charcoal, soot mixed with grease, etc., came into use.

The map technique of primitive peoples is naturally very simple as compared with our complicated processes. The technical requirements of a modern map are so great that in Germany, where the best maps in the world are made, three years frequently elapse from the time of the first survey drawing to the final printing of the map.

We make large and discriminating use of colors on maps, and different colors and different shades of the same color are used to express a large variety of meanings. A variety of colors is not found on the maps of primitive folk. Only one map is known, a Tchuktchi map already mentioned, which is colored with reindeer blood, on which deeper tints are used for fords, mountains, and the edges of forests.

Rivers and lakes are more likely to be shown than any other natural phenomenon. Sea coasts are often very incorrectly given, owing to the unfamiliarity of many tribes with coasts.

Routes come first among anthropogeographical elements shown.

Footprints are given to show the direction of movement; also sledge hunting roads in snow-covered countries; animal paths and fording places and human habitations, whether in the northern tundra or the tropical forest. A fish drawn on land means that there is fine fishing in the neighboring waters. Groups of dots on Wissner's Eskimo maps show where musk-ox herds may be found.

It is impossible in this brief summary to give an adequate idea of the thorough and detailed study of the primitive and early phases of map-making, the results of which are given in this quarto volume of 350 pages. The work embodies the fruits of the most exhaustive examination of this important subject that has yet been made. The author says modestly, in conclusion:

"The considerable material collected and presented here by us speaks for itself. If it should awaken further interest and stimulate further research and investigation, or be used as the basis for other works, we shall feel amply rewarded."

NOTES ON THE DESCRIPTION OF LAND FORMS.—VI.

A CUESTA IN MIDDLE GERMANY. DER STEIGERWALD: ein Beitrag zur Geographie Frankens, by J. Schwender (*Forsch. f. Deut. Landes- u. Volkskunde*, xvii, 1908, 1-118). The studies of German geography, among which the one above cited is published, are now approaching their twentieth volume. They consist of a series of essays by experts on various local themes, accepted with the sanction of a Central Commission for Scientific Geography in Germany, edited at present by Professor Hahn of Königsberg, and published by Englehorn in Stuttgart. The *Forschungen* may therefore be regarded as presenting the various methods of treating geographical problems that are accepted as scholarly and effective by German geographers of high standing. An essay by Sölch in a recent volume was reviewed in the fifth number of these notes, as an illustration of the helpful use of deduction, in addition to other mental processes, in geographical presentation. The essay here cited shows how greatly an approved method of treatment of land forms may vary from the deductive treatment employed by Sölch.

A part of Franconia in northern Bavaria, which, with respect to neighboring cities, lies between Würzburg, Bamberg and Nürnberg—or which, with respect to rivers, lies between a north bend of the Main and its southern branch, the Regnitz; or with respect to dimensions, measures about 70 kil. north and south by 50 kil. east and west; or with respect to structure, occupies a north-central part of the broadly truncated monocline of strong and weak strata that dip gently eastward and southeastward from the fundamental crystallines in the